Public Abstract
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Title:LOAD AND RESISTANCE FACTOR DESIGN OF DRILLED SHAFTS AT THE SERVICE LIMIT STATE

In current AASHTO design specifications (AASHTO, 2007), the resistance factor for service limit states (except for extreme events) for all cases and for all geomaterials, takes the value of 1.0, implying that more research is needed. This dissertation focuses on resistance factor for drilled shaft at the service state limit. The work starts with developing a model for drilled shaft load transfer characteristics and quantifying the uncertainty of the model. Parametric study was conducted to understand how the service limit state resistance factor for drilled shaft depends on probabilistic and deterministic variables. The most influencing parameters on the resistance factor were found, and based on a process of combining and normalizing input parameters and eliminating insensitive parameters, an equation to calculate the resistance factor for drilled shafts in shale was developed. The equation is a function of four parameters, instead of the original twenty four. The four parameters are normalized load, coefficient of variation of geomaterial strength, probability of failure, and shaft length over shaft diameter ratio. This study also establishes a design procedure for evaluation of service limit state for drilled shafts to achieve target probabilities of failure. The equation and the design procedure free geotechnical engineers from using probabilistic calculation in designing drilled shaft at service limit. Step-by-step instructions on how to apply the resistance factor to the drilled shaft design at service limit state are presented. This research provides a more efficient design procedure for evaluation of service limit state, thereby improving cost-effectiveness.